IX. RESIDENCE ADJUSTMENT

Personal income is a measure of income by place of residence. The place of residence for individuals is the state and county in which they live. The place of residence for quasi-individuals[1] is defined for the measurement of personal income as the state and county of the residence of the individuals who benefit from the activities of the quasi-individuals or on whose behalf the income is received.

The residence of military personnel is the state in which they live while they are on military assignment, not their permanent or legal state of residence. Thus, the income of military personnel on foreign assignment is excluded from the state and local area personal income series, because their residence is outside of the territorial limits of the United States.

The residence of seasonal migrant workers, except those working in Alaska, is the state in which they live while they are working, not their usual state of residence. The treatment of seasonal migrant workers working in Alaska is discussed below. The residence of foreign citizens who work for international organizations, foreign embassies, or consulates in the United States is the country of which they are citizens.

These definitions of residence differ slightly from some of those used by the Census Bureau, which provides source data that are used in the preparation of the residence adjustment estimates and the estimates of population that are used to calculate per capita personal income. For example, the residence of seasonal migrant workers is sometimes reported to the Census Bureau as their usual place of residence rather than the state in which they are living and working on April 1 when the decennial census of population is taken.

The source data for most of the components of personal income are recorded, or treated as if they were recorded, on a place-of-residence basis. These components, which compose 40 percent of personal income, are current personal transfer receipts, dividends, interest, and rent, and proprietors' income.[2]

However, most of the source data for the remaining three components are recorded by place of work. These components are wage and salary disbursements, supplements to wages and salaries, and contributions for government social insurance. Therefore, the initial estimates of most of the subcomponents of these three components are on a place-of-work basis. Consequently, these initial place-of-work estimates are adjusted so that they will be on a place-of-residence basis and so that the income of the recipients whose place of residence differs from their place of work will be correctly assigned to its state of residence.

Correctly assigning the place of residence of the recipient of the income is more important for the state estimates than for the national estimates. For the state estimates, the income of individuals who commute to work between states is especially important for those states with substantial portions of their economies in metropolitan areas that extend across state boundaries—for example, the Washington-Arlington-Alexandria, DC-VA-MD-WV metropolitan statistical area.

---

[1] "Quasi-individuals" consist of nonprofit institutions that primarily serve individuals, private noninsured welfare funds, and private trust funds.

[2] For specific information about the source data for the estimates of the major components, see the section "Geographic characteristics of the source data" in the "Overview."

The state estimates of the residence adjustment are prepared for the net labor earnings—or "income subject to adjustment"—of interstate commuters and for the wages and salaries of border workers. Income subject to adjustment is defined as wages and salaries plus supplements to wages and salaries minus the contributions for government social insurance. Because a single residence adjustment estimate is prepared for each state, estimates of these components by industry and by place of residence are not available.[3]

Procedure for the Income of Interstate Commuters

The state estimates of the residence adjustment are based on the most recent county estimates in order to incorporate data for the particular local areas where most of the interstate commuting occurs. The state estimates of residence adjustment for 2001-2003 were derived from the county estimates for 2001-2002. These county estimates of residence adjustment for 2001-2002 were calculated as part of a complete benchmark revision of the estimates of personal income and employment.

The derivation of state residence adjustment estimates uses the interstate commuting flows identified in the most recent county estimates. State-to-state commuting ratios were calculated by summing the 2001-2002 county-to-county interstate flows to yield state-to-state flows. Each flow for the state of residence was then divided by the "income subject to adjustment" (ISA) of the corresponding state of work from the most recent county estimates. Those ratios were then applied to the revised estimates of ISA for 2001-2002 to create interstate "gross flows". The 2002 ratios were also applied to the new 2003 ISA estimate. Finally, the outflows from each state were subtracted from the inflows to the state to yield residence adjustment estimates for the income of interstate commuters.

Procedure for the income of intercounty commuters, 2001-2002

The county estimates for 2001, which are used in the preparation of the state estimates for 2001-2003 and for county estimates for 1990-2002, were derived in two steps. First, the provisional estimate for each county was prepared. Second, the provisional estimates for counties in urban areas were modified.

The 2001 estimates were then used to develop the county estimates for 2002 because intercounty commuting data are available only from the decennial censuses of population.[4]

Provisional estimates for 2001.—The procedure that is used to prepare the estimates of the county residence adjustment for 2001 is illustrated by the following example of the calculation of the provisional estimates for a two-county area that

[3] Reliable estimates of the residence adjustment by industry cannot be prepared because some of the source data that are used to infer changes in interarea commuting since the last census of population are not available by industry.

[4] The benchmark year had to be 2001 instead of 2000 because 2001 is the first year that BEA provides earnings and employment estimates that are based on the 2002 North American Industry Classification System (NAICS), which is consistent with the industry structure of the Census Bureau's journey-to-work (JTW) data that was derived as part of the 2000 Census of Population. BEA's estimates of earnings and employment for 2000 are based on the 1987 Standard Industrial Classification (SIC).

comprises counties f and g. The example is easily generalized to the calculation of the estimates for more complex areas.

The provisional 2001 estimate of the residence adjustment estimate for county f (RA_f) was calculated as the total 2001 inflows of the income subject to adjustment to county f from county g ($IN_{f.}$) minus the total 2001 outflows of the income subject to adjustment from county f to county g ($OUT_{f.}$).

$$RA_f = IN_f - OUT_f$$

The estimates of $IN_{f.}$ and $OUT_{f.}$ were prepared in industrial detail.[5] The share ($I_{f,k}$) of total wages or of supplements to wages and salaries in a particular industry k in county g that were earned by residents of county f was used in the estimation of industry-level inflows to county f. Analogously, the share ($O_{f,k}$) of wages or of supplements to wages and salaries in a particular industry k in county f that were earned by residents of county g was used in the estimation of industry-level outflows from county f. Both $I_{f,k}$ and $O_{f,k}$ were calculated from journey-to-work (JTW) data on the number of wage and salary workers (W) and on their average wages (A) by county of work for each county of residence from the 2000 Census of Population.

$$I_{f,k} = \frac{wages\ earned\ in\ g\ by\ residents\ of\ f}{total\ wages\ earned\ in\ g}$$

$$= \frac{\left(W_{(f\to g),k}\right)\left(A_{(f\to g),k}\right)}{\left(W_{(f\to g),k}\right)\left(A_{(f\to g),k}\right)+\left(W_{(g\to g),k}\right)\left(A_{(g\to g),k}\right)}$$

$$O_{f,k} = \frac{wages\ earned\ in\ f\ by\ residents\ of\ g}{total\ wages\ earned\ in\ f}$$

$$= \frac{\left(W_{(g\to f),k}\right)\left(A_{(g\to f),k}\right)}{\left(W_{(g\to f),k}\right)\left(A_{(g\to f),k}\right)+\left(W_{(f\to f),k}\right)\left(A_{(f\to f),k}\right)}$$

[5] The inflows and the outflows of wages and salaries and of supplements to wages and salaries for 2001-2002 were estimated for private industries by North American Industry Classification System sectors and for the public sector by Federal civilian, military, and state and local governments.
The inflows and the outflows of personal contributions were also calculated, but the calculations are at a more aggregated level because the estimates of the contributions by private-sector employees are not made by industry.
The county-to-county commuting ratios by industry developed in this step will be applied to income subject to adjustment (ISA) for 2002 to derive gross inflow and gross outflow estimates for each county.

Where two subscripts are used with an arrow, the first subscript identifies the place of residence, and the second identifies the place of work. For example, $W_{(f \to g),k}$ is the number of workers in industry k who lived in county f but who worked in county g.

The industry-level inflows to county f from county g ($IN_{f,k}$) were calculated as the inflow ratio multiplied by the corresponding component of the income subject to adjustment (ISA) in industry k in county g ($ISA_{g,k}$). The industry-level outflows from county f to county g ($OUT_{f,k}$) were calculated as the outflow ratio multiplied by the ISA in industry k in county f ($ISA_{f,k}$).

$$IN_{f,k} = (I_{f,k})(ISA_{g,k})$$

$$OUT_{f,k} = (O_{f,k})(ISA_{f,k})$$

Summing the inflows for all industries yields the total inflows to county f ($IN_{f.}$), and summing the outflows for all industries yields total outflows from county f ($OUT_{f.}$).

$$IN_{f.} = \sum_{k=1}^{N} IN_{f,k}$$

$$OUT_{f.} = \sum_{k=1}^{N} OUT_{f,k}$$

Modifying the provisional 2001 estimates.—The provisional 2001 estimates of the residence adjustment for some counties were modified in three cases. In the first case, the estimates for each of the over 1200 counties that are in urban clusters that have high rates of commuting among their constituent counties (mostly multicounty metropolitan areas) were modified to incorporate the 1999 distribution of wages and salaries from the 2000 Census.[6] The estimates for these counties were modified because in numerous cases, the geographic coding by place of work of the JTW data and that of the source data for wages and salaries are inconsistent.[7]

First, the provisional estimate of wages and salaries by place of residence for each county in each cluster was calculated as the estimate of wages and salaries by place of work plus the net residence adjustment for wages and salaries.[8] Second, the provisional

[6] The 1999 distribution reflects the place of residence of the income recipients on April 1, 2000, not their place of residence when they received the wages and salaries.

[7] For example, the source data may attribute too much of the wages of a multi-establishment firm to the county in which a firm's main office is located; the source data for the wages of the personnel employed on a military base that extends across county boundaries may attribute the wages to one county, but the JTW data may attribute these wages to the other county.

[8] The net residence adjustment that is used for this calculation includes only the intercounty flows for wages and salaries.

place-of-residence estimates of wages for the counties in each cluster were summed to a total estimate for the cluster. Third, the total estimate for each cluster was allocated to the counties of the cluster in proportion to the 1999 wage-and-salary distribution from the 2000 Census in order to produce the modified provisional estimates of wages and salaries by county of residence. Fourth, the estimate of the residence adjustment for each county in the cluster was calculated as the modified provisional estimate of place-of-residence wages minus the provisional estimate of place-of-residence wages plus the provisional estimate of the residence adjustment.

The difference between the estimate of the residence adjustment and the provisional estimate of the residence adjustment was expressed as a flow between pairs of counties in the same cluster in order to facilitate the extrapolation of the 2001 residence-adjustment estimates to 2002. In the simplest situation—a two-county cluster—the additional flow was assumed to be from the county with the negative difference to the county with the (exactly offsetting) positive difference.

In the second case, the provisional estimate of the residence adjustment for each county in 136 pairs of adjacent counties that are not in a cluster was modified because the 2001 provisional place-of-residence estimate of wages for one of the counties exceeded the place-of-residence measure of wages from the 2000 Census by a substantial amount and because the census measure for the other county exceeded the provisional estimate by a similar substantial amount. In order to facilitate the extrapolation of the 2001 residence-adjustment estimates to 2002, these adjacent-county modifications were also expressed as intercounty flows.

In the third case, the provisional 2001 estimates of the residence adjustment for eight county equivalents (boroughs and Census areas) in Alaska were modified to account for the large amounts of ISA received by seasonal workers from out of state. The provisional estimates yielded place-of-residence estimates of wages and salaries that were so much higher than the comparable decennial census data that they could not be an accurate reflection of only the wages of the permanent residents. In order to remove the excess amounts, the JTW-data-based outflows from these county equivalents to selected large counties in Washington, Oregon, and California were judgmentally increased. In order to facilitate the extrapolation of the 2001 residence adjustment estimates to 2002, these modifications to the eight county equivalents in Alaska were also expressed as intercounty flows.

Procedure for the income of intercounty commuters, 1990-2000

The county estimates of residence adjustment for 1990-2000 were developed using journey-to-work (JTW) data on intercounty commuting from both the 1990 and 2000 Census of Population. Estimates for the earlier years were based more heavily on the 1990 JTW data, while the later years were based more on the 2000 JTW data.

Preliminary estimates for 1990-2000.—The preliminary estimates for 1990-2000 were developed by using a sequential set of procedures. First, intercounty commuting ratios were developed from both the 1990 and 2000 JTW data. The ratios show the percentage of wages earned in a county that were earned by residents of other counties. The 1990 JTW ratios were based on Standard Industrial Classification (SIC)

industry categories, while 2001 JTW ratios were developed from the 2000 JTW data at an all-industry level.[9]

The intercounty commuting ratios for 1990 and 2001 were multiplied with income subject to adjustment estimates for 1990-2000 to derive estimates of gross commuting flows between counties. These commuting flows were averaged so that the earlier years were weighted more heavily by the 1990 ratios, while the later years were weighted more heavily by the 2001 ratios. The commuting flow data was then summed to the county level to determine net flows based on JTW data.[10]

In addition, weighted benchmark year adjustment ratios for BEA cluster counties[11] were developed for 1990-2000 to account for differences between the results of the JTW data and the residential-based wage data that were calculated in both the 1990 and 2000 Census of Population. These ratios were applied to total income subject to adjustment (ISA) to develop additional gross flow estimates for these cluster counties. These additional gross flows were then summed to the county level to obtain net flows for 1990-2000.

Next, benchmark adjustment ratios were developed for 136 pairs of non-cluster counties that had significant differences between JTW-based residential wage estimates and those from the decennial census. In these cases, 1990-based non-cluster ratios were applied to ISA for 1990-2000 because 2000-based ratios were not yet available.

Benchmark adjustment ratios were also developed to account for large differences between JTW-based residential wage estimates and residential wage estimates from both the 1990 and 2000 Census of Population for eight county equivalents in Alaska. These ratios were used to remove excess amounts of JTW-based inflows from these counties, and to insert the inflows into selected large counties in Washington, Oregon, and California.

Finally, estimates of commuting between Canada and Mexico were developed for 1990-2000. These border flow estimates were controlled to the residence adjustment estimates for the United States (see below).

The gross flow estimates from the above steps were summed for each county. The resulting gross flows were then summed to the county level to obtain net flows. The total net flows were the final residence adjustment estimates for non-cluster counties. For cluster counties, the total net flows became the preliminary estimates of residence adjustment. These estimates were modified as follows.

---

[9] JTW ratios for 2001, instead of 2000 ratios, were developed because the 2000 JTW data is based on the North American Industry Classification System (NAICS), while BEA's 2000 income and employment data is based on the Standard Industrial Classification (SIC). The first year that BEA has income and employment estimates available that are based on NAICS sectors is for 2001. For this reason, 2001, instead of 2000, became the benchmark year to apply the new 2000 JTW commuting data.
All-industry JTW ratios for 2001 were developed to apply to BEA income subject to adjustment (ISA) data because BEA estimates of income and employment for 1990-2000 are based on SIC definitions of industries.

[10] The core counties in large urban areas (e.g. Cook County, IL) often have negative net flows. This is a result of the large number of people who work in the core county but reside in nearby counties. These "outflows" from the core county often exceed the "inflows" of income that residents of the core county earn in other counties.

[11] A BEA cluster county is one county in a group of counties that has a high rate of commuting with other counties in the group. BEA clusters are based mostly on official metropolitan area definitions.

Modifying the preliminary estimates for cluster counties, 1990-2000.—The 1990-2000 residence adjustment estimates for cluster counties were modified by annual place-of-residence based IRS wage and salary data that BEA uses to supplement the JTW data from both the 1990 and 2000 Census of Population. The IRS wages were used to determine the relative growth rates of income for cluster counties between the decennial census years.

First, ratios of residence-adjusted income subject to adjustment (RAISA) to IRS wages were calculated for 1990 and 2001 for each cluster county.[12] Second, the 1990 and 2001 ratios were used to develop weighted RAISA/IRS ratios for 1990-2000 for each cluster county based on the difference amount between the 1990 and 2001 ratios. The difference amount was weighted throughout the decade to capture the relative growth over time. Third, the weighted ratios for 1990-2000 were multiplied with the actual 1990-2000 IRS wage estimates to create adjusted IRS wages for the cluster counties.

Next, each cluster county's relative share of adjusted IRS wages for 1990-2000 within its BEA county cluster was calculated. This relative share for each cluster county was multiplied with its county cluster total of RAISA to derive adjusted RAISA estimates for each cluster county for 1990-2000.

The final residence adjustment estimates for 1990-2000 for cluster counties were calculated by subtracting total income subject to adjustment (ISA) from the adjusted RAISA estimates.

Procedure for the Income of Border Workers

The residence adjustment for the income earned by border workers accounts for the inflows of the wages and salaries earned by U.S. residents who commute to work in Canada and the outflows of the wages and salaries earned by Canadian and Mexican residents who commute to work in the United States.

The national estimates of inflows and outflows of the wages and salaries of the border workers are prepared in the context of the balance of payments accounts. The portion of the wages received by the U.S. resident border workers that is estimated to be spent in the nations where they work is classified in the national income and product accounts (NIPAs) as part of imports. The portion of the wages received by the foreign-resident border workers that is estimated to be spent in the United States is classified in the NIPAs as part of exports.

The state estimates of the inflows and the outflows of the wages and salaries of border workers are allocations of the national control totals that are drawn from the rest-of-the-world account.[13] The allocated inflows are added to, and the allocated outflows are

[12] Residence-adjusted income subject to adjustment (RAISA) equals income subject to adjustment (ISA) plus residence adjustment.

[13] The national rest-of-the-world account includes several estimates that are omitted from the state estimates. These are estimates of the wages and salaries of (1) U.S. residents working temporarily (for 1 year or less) abroad, (2) foreign residents working temporarily in the U.S., and (3) foreign students enrolled in U.S. colleges and universities. In addition, the rest-of-the-world account includes an estimate of the wages and salaries received by U.S. citizens who are employed in the United States by foreign embassies and consulates and by international organizations; this estimate is included in the state estimates of wage and salary disbursements.

subtracted from, the estimates of the net residence adjustment for the income of interstate commuters to obtain the final residence adjustment estimates.

The national estimate of the inflows of the wages and salaries earned by U.S. residents who commute to work in Canada are assigned to Michigan, New York and the New England region on the basis of fragmentary information from the Immigration and Naturalization Service of the Department of Justice. The New England portion is allocated to the border counties of Maine, New Hampshire, and Vermont in proportion to data for employment in the forest product industries.

The national estimates of the outflows of the wages and salaries earned by residents of Mexico and Canada who commute to work in the United States are allocated to states in proportion to the data from the Immigration and Naturalization Service.